ADD MANUAL TO OUR DATA BASE

Power Fault Rack

PFR-1089

Calibration Procedure

Compliance Design

MP MASTER
MA34952

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Meter	Test	Criteria		Measured Values		Percent Error		Results
		Voltage	Current	Voltage	Current	Voltage	Current	Pass/Fail
Tip	Tip							
Ring	Ring							

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770-925-2444

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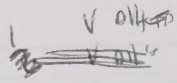
Details: Password (Alt) (Shift) (F7)

CARD 1



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17 t.p
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test time 100 sec.

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Introduction

This document details the calibration and verification procedure of the Compliance Design PFR-1089 Power Fault Rack. The Power Fault Rack is designed to perform power fault testing to the Level 1 and Level 2 Bellcore GR-1089 specification, and optionally to UL 1459 / UL 1950.

The operation of the Power Fault Rack is detailed in the document "Power Fault Rack PFR-1089 Installation and Operation Manual".

Throughout this document, you will find the following notices:

NOTE: **This is a note that describes an important step or procedure.**

WARNING: ***This is a warning and as such pay particular attention to what is said. May be potentially life threatening.***

Please read each note or warning until you fully understand it. Only after you understand the note or warning should you proceed.

Please direct any comments or questions to

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Equipment

The following list summarizes the *minimum* requirements for equipment used to calibrate the Power Fault Rack:

Manufacturer	Model	Description
Fluke (Two)	87	True-RMS Voltmeter with at least a 10 Mohm Input Impedance (3.5 digit or better)
Fluke	5105B	Calibrator (3.5 digit or better, 1000VAC @ 60 Hz minimum voltage)
Pearson (Two)	101	Wideband Current Probe, .01V/A

In addition, you will need the computer controller and cables described in the Installation and Operations Manual.

Voltage Divider Calibration

Step 1 - Opening up the Power Fault Rack

Ensure that the Power Fault Rack is turned off at ***both*** the rear safety disconnect and at the main source of power. Open the left door behind the operator controls. (See Figure 1)

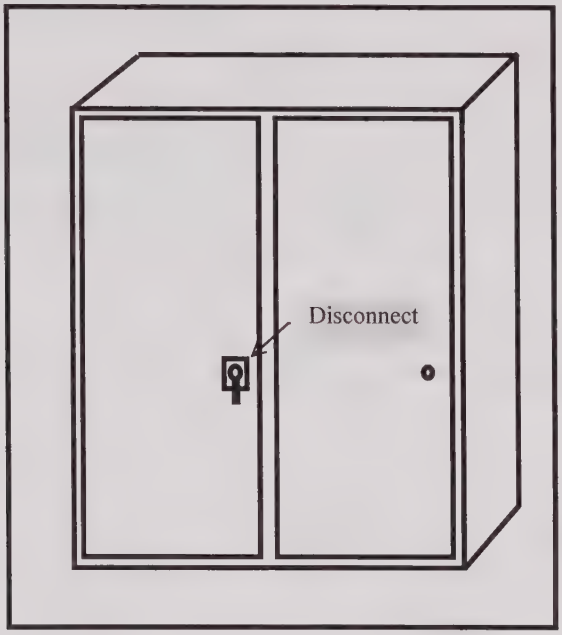

Figure 1 - Rear view of the Power Fault Rack

About two-thirds of the way up, you will find the rear of the four meters mounted in the front panel. To the right of the meters you will find a printed circuit board populated with fixed resistors and potentiometers (See Figure 2). This board contains the voltage divider (See Figure 3) used to supply a reduced voltage to the two volt meters.

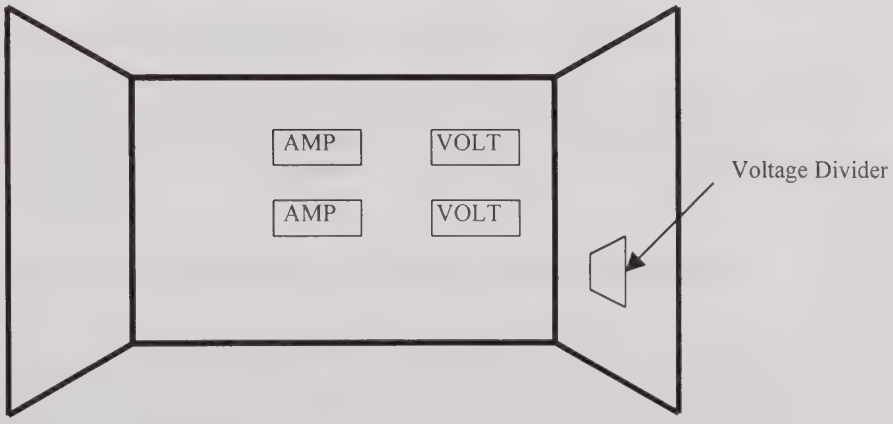

Figure 2 - Rear view Location of Voltage Divider

Step 2 - Checking the calibration of Tip Data Acquisition Connection

Locate the HP data acquisition unit located at the top right of the rack. Push the LOCAL button on the HP data acquisition unit. Rotate the knob until 101 is displayed. Push the MEASURE button and rotate the knob until AC VOLT is displayed. Push MEASURE button twice. Connect the Fluke 5101B calibrator output leads to points ***Return*** and ***Tip-In*** as indicated on Figure 3. Connect the Fluke 87 to the points ***Return*** and ***HP-Tip-Out*** as indicated in Figure 3. Note, **do not** disconnect the HP data acquisition connection from the voltage divider during this step.

WARNING: Be sure NOT to touch ANY leads while performing this procedure. 50 VAC is potentially lethal!

Set the Fluke 5101B calibrator to output 50 VAC @ 60 Hz. The Fluke 87 DMM should read 5.00 ± 0.05 VAC. If the reading is within ±0.05 VAC, skip to Step 3. Otherwise, adjust R54 until the Fluke 87 DMM reads 5.00 ± 0.05 VAC.

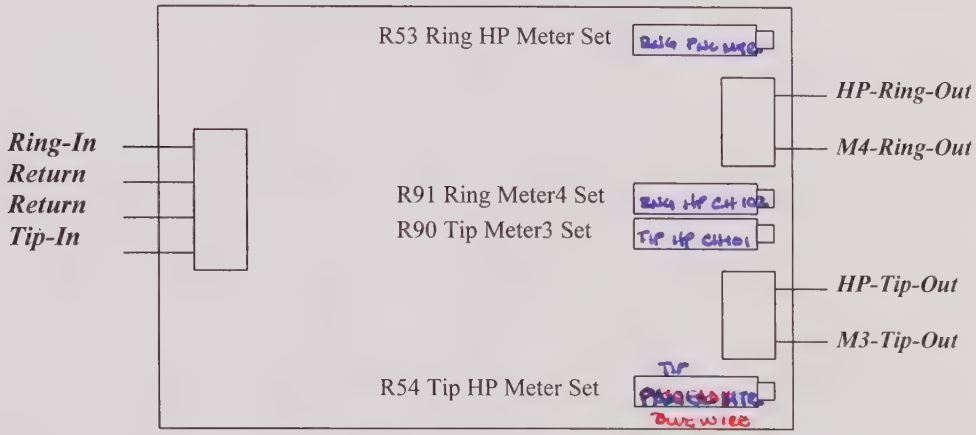

Figure 3 - View of the Voltage Divider

Step 3 - Checking the calibration of Tip Meter Connection

Disconnect the Fluke 87 from ***HP-Tip-Out*** and then connect it to ***M3-Tip-Out*** as indicated in Figure 3. Note, **do not** disconnect the HP data acquisition connection from the voltage divider during this step. You should disconnect meter 3 from the voltage divider during this step. The Fluke 87 DMM should read 50.0 ± 0.5 mVAC. If the reading is within ±0.5 mVAC, skip to Step 4. Otherwise, adjust R90 until the Fluke 87 DMM reads 50.0 ± 0.5 mVAC.

Step 4 - Checking the calibration of Ring Data Acquisition Connection

Reconnect meter 3 to the voltage divider. Locate the HP data acquisition unit located at the top right of the rack. Push the LOCAL button on the HP data acquisition unit. Rotate the knob until 102 is displayed. Push the MEASURE button and rotate the knob until AC VOLT is displayed. Push MEASURE button twice. Connect the Fluke 5101B calibrator output leads to points ***Return*** and ***Ring-In*** as indicated on Figure 3. Connect the Fluke 87 to the points ***Return*** and ***HP-Ring-Out*** as indicated in Figure 3. Note, **do not** disconnect the HP data acquisition connection from the voltage divider during this step.

WARNING: Be sure NOT to touch ANY leads while performing this procedure. 50 VAC is potentially lethal!

Set the Fluke 5101B calibrator to output 50 VAC @ 60 Hz. The Fluke 87 DMM should read 5.00 ± 0.05 VAC. If the reading is within ±0.05 VAC, skip to Step 3. Otherwise, adjust R53 until the Fluke 87 DMM reads 5.00 ± 0.05 VAC.

Step 5 - Checking the calibration of Ring Meter Connection

Disconnect the Fluke 87 from ***HP-Ring-Out*** and then connect it to ***M4-Ring-Out*** as indicated in Figure 3. Note, **do not** disconnect the HP data acquisition connection from the voltage divider during this step. You should disconnect meter 4 from the voltage divider during this step. The Fluke 87 DMM should read 50.0 ± 0.5 mVAC. If the reading is within ±0.0005 VAC, reconnect meter 4 to the voltage divider and skip to Step 6. Otherwise, adjust R91 until the Fluke 87 DMM reads 50.0 ± 0.5 VAC and reconnect meter 4 to the voltage divider.

Calibrating the Voltmeters

Step 1 - Checking the calibration - Tip

Before the meter options can be changed, the meter lockout feature needs to be disabled on all the meters.

Disable Hardware Lockout:

To access the hardware lockout jumper, remove the rear panel by first removing any connectors that are installed. Press down on both rear panel retaining tab releases and pull the top of the rear panel away from the case. The bottom of the rear panel will now lift out. After removing the rear panel, the meter can be taken out of the case by carefully grasping the power supply board and signal conditioner board at the connectors and sliding the unit out the back of the case. Remove jumper "a" located on the lower portion of the power supply board next to the input connectors. This will enable the software lockouts. Place the meter back in the case, reinstall the rear panel and reinstall all connectors.

Disable Software Lockout:

Push the "MENU" key until "Loc 1" is displayed. Push the " ▸ " key. Set all "11111"s to "00000"s by pushing the " ▴ " and " ▸ " keys. Press the MENU key until the original voltage display is shown.

Turn the rack off and connect the Fluke 5101B calibrator output leads to points ***Return*** and ***Tip-In*** as indicated in Figure 3 (note, all other connections to ***Return*** and ***Tip-In*** should be disconnected). Close and latch the door on the rear of the Power Fault Rack. Place the rack disconnect switch to the on position. Also turn on the main disconnect.

Turn on the control panel with the key switch. Short the tip voltage monitor jack on the front of the control panel. (See Figure 4)

NOTE: ***Do NOT enable the rack at this time!***

Allow the meter to stabilize for one minute. The tip meter should read 0.0 ± 0.5 VAC. If the meter needs adjusting, proceed with Step 2 - Zeroing the meter - Tip. Otherwise proceed to Step 3 - Checking the span - Tip.

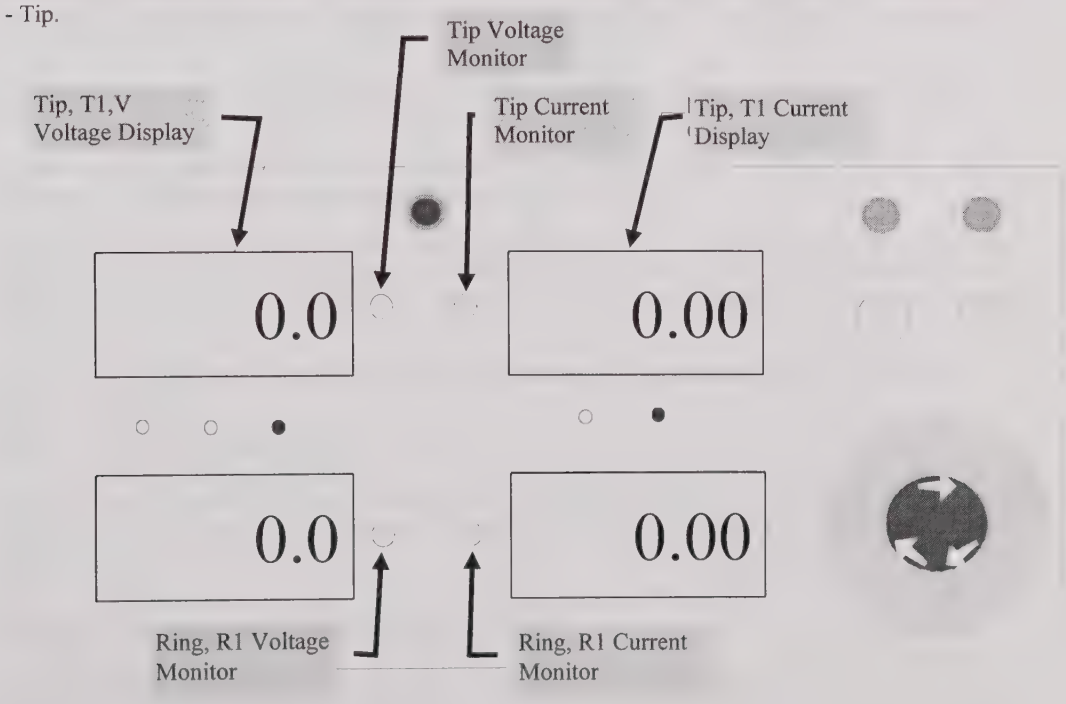

Figure 4 - Front Control Panel

Step 2 - Zeroing the meter - Tip

Press "MENU" key until "Setup" is displayed. Press the " ▸ " key until the second number from the right flashes. Press the " ▴ " key until "00010" is displayed. Press "MENU" key until "Lo in" is displayed. Press the " ▸ " key until the furthest digit to the right is flashing. Press " ▴ " key until the number is increased or decreased by 1 (depending on direction of offset desired). Press "MENU" key until the meter is reset. Repeat this process until 0.0 ± 0.0 VAC to be displayed.

If the meter will not zero you will need to have it serviced.

Step 3 - Checking the span - Tip

Remove the short from the tip monitor port (See Figure 4). Make sure that both the rack disconnect and the main disconnect are in the on position. Turn on the rack with the key switch.

NOTE: ***Do NOT enable the rack at this time!***

WARNING: The voltage applied in the next step is lethal. Please be sure that there are no exposed wires!

Turn on the Fluke 5101B Calibrator and adjust the output to 1000 VAC @ 60 Hz. The tip voltmeter should read 1000.0 ± 4.0 VAC. If the meter reads OK, proceed with Step 5 - Checking the calibration - Ring. Otherwise continue with Step 4 - Adjusting the span - Tip.

Step 4 - Adjusting the span - Tip

Ensure that the Fluke calibrator is connected to the voltage divider as described previously. Turn both the rack and main disconnect on. Turn on the rack with the key switch. Adjust the Fluke 5101B Calibrator to 1000 VAC @ 60 Hz.

Press "MENU" key until "Setup" is displayed. Press the " ▸ " key until the second number from the right flashes. Press the " ▴ " key until "00010" is displayed. Press "MENU" key until "Hi in" is displayed. Press the " ▸ " key until the furthest digit to the right is flashing. Press " ▴ " key until the number is increased or decreased by 1 (depending on direction of offset desired). Press "MENU" key until the meter is reset. Repeat this process until 1000.0 ± 4.0 VAC to be displayed.

If you cannot get the meter to read 1000.0 ± 4.0 VAC, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 5 - Checking the calibration - Ring

Turn the rack off and connect the Fluke 5101B calibrator output leads to points ***Return*** and ***Ring-In*** as indicated in Figure 3 (note, all other connections to ***Return*** and ***Ring-In*** should be disconnected). Close and latch the door on the rear of the Power Fault Rack. Place the rack disconnect switch to the on position. Also turn on the main disconnect.

Turn on the control panel with the key switch. Short the tip voltage monitor jack on the front of the control panel. (See Figure 4)

NOTE: ***Do NOT enable the rack at this time!***

Allow the meter to stabilize for one minute. The ring meter should read 0.0 ± 0.5 VAC. If the meter needs adjusting, proceed with Step 6 - Zeroing the meter - Ring. Otherwise proceed to Step 7 - Checking the span - Ring.

Step 6 - Zeroing the meter - Ring

Press "MENU" key until "Setup" is displayed. Press the " ▸ " key until the second number from the right flashes. Press the " ▴ " key until "00010" is displayed. Press "MENU" key until "Lo in" is displayed.

Press the " ▸ " key until the furthest digit to the right is flashing. Press " ▲ " key until the number is increased or decreased by 1 (depending on direction of offset desired). Press "MENU" key until the meter is reset. Repeat this process until 0.0 ± 0.0 VAC to be displayed.

If the meter will not zero you will need to have it serviced.

Step 7 - Checking the span - Ring

Remove the short from the tip monitor port (See Figure 4). Make sure that both the rack disconnect and the main disconnect are in the on position. Turn on the rack with the key switch.

NOTE: ***Do NOT enable the rack at this time!***

WARNING: The voltage applied in the next step is lethal. Please be sure that there are no exposed wires!

Turn on the Fluke 5101B Calibrator and adjust the output to 1000 VAC @ 60 Hz. The tip voltmeter should read 1000.0 ± 4.0AC. If the meter reads OK, proceed with Caibrate the Current Meters otherwise continue with Step 8 – Adjusting the span – Ring.

Step 8 - Adjusting the span - Ring

Ensure that the Fluke calibrator is connected to the voltage divider as described previously. Turn both the rack and main disconnect on. Turn on the rack with the key switch. Adjust the Fluke 5101B Calibrator to 1000 VAC @ 60 Hz.

Press "MENU" key until "Setup" is displayed. Press the " ▸ " key until the second number from the right flashes. Press the " ▲ " key until "00010" is displayed. Press "MENU" key until "Hi in" is displayed. Press the " ▸ " key until the furthest digit to the right is flashing. Press " ▲ " key until the number is increased or decreased by 1 (depending on direction of offset desired). Press "MENU" key until the meter is reset. Repeat this process until 1000.0 ± 4.0 VAC to be displayed.

If you cannot get the meter to read 1000.0 ± 4.0 VAC, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Calibrating the Current Meters

Step 1 - Checking the calibration - Tip

Close and latch the door on the rear of the Power Fault Rack. Turn the main disconnect to the on position, then turn on the rack disconnect.

Turn on the rack with the key switch. Short the tip current monitor jack on the front of the control panel. (See Figure 4)

NOTE: ***Do NOT enable the rack at this time!***

Allow the meter to stabilize for one minute. The tip meter should read 0.00 ± .05 AAC. If the meter needs adjusting, proceed with Step 2 - Zeroing the meter - Tip. Otherwise proceed to Step 3 - Checking the span - Tip.

Step 2 - Zeroing the meter - Tip

Press "MENU" key until "Setup" is displayed. Press the " ▸ " key until the second number from the right flashes. Press the " ▴ " key until "00010" is displayed. Press "MENU" key until "Lo in" is displayed. Press the " ▸ " key until the furthest digit to the right is flashing. Press " ▴ " key until the number is increased or decreased by 1 (depending on direction of offset desired). Press "MENU" key until the meter is reset. Repeat this process until 0.00 ± 0.05 VAC to be displayed.

If the meter will not zero you will need to have it serviced.

Step 3 - Checking the span - Tip

Remove the short from the tip current monitor port on the front control panel. Make sure that both the rack and main disconnect are on. Turn on the rack with the key switch.

NOTE: ***Do NOT enable the rack at this time!***

WARNING: Do NOT touch ANY items inside of the control box during the next step! There is 120 VAC line voltage present!

Connect the Fluke 5101B Calibrator to the tip current monitor jack and adjust the output to 0.6 VAC @ 60 Hz. The front panel tip current meter should read 60.00 ± 0.5 AAC. If the meter reads OK, proceed with Step 5 - Checking the calibration - Ring. Otherwise continue with Step 4 - Adjusting the span - Tip.

Step 4 - Adjusting the span - Tip

Ensure that the Fluke calibrator is connected as described in Step 3. Turn both the rack and main disconnect on. Turn on the rack with the key switch. Adjust the Fluke 5101B Calibrator to 0.600 VAC @ 60 Hz.

Press "MENU" key until "Setup" is displayed. Press the " ▸ " key until the second number from the right flashes. Press the " ▴ " key until "00010" is displayed. Press "MENU" key until "Hi in" is displayed. Press the " ▸ " key until the furthest digit to the right is flashing. Press " ▴ " key until the number is increased or decreased by 1 (depending on direction of offset desired). Press "MENU" key until the meter is reset. Repeat this process until 60.00 ± 0.50 AAC to be displayed.

If you cannot get the meter to read 60.00 ± 0.50 AAC, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 5 - Checking the calibration - Ring

Close and latch the door on the rear of the Power Fault Rack. After making sure that there are no wires pinched or exposed from a previous calibration procedure, turn both the rack disconnect and the main disconnect to the on position.

Turn on the control panel with the key switch. Short the tip current monitor jack on the front of the control panel. (See Figure 4)

NOTE: ***Do NOT enable the rack at this time!***

Allow the meter to stabilize for one minute. The ring meter should read 0.00 ± .05 AAC. If the meter needs adjusting, proceed with Step 6 - Zeroing the meter - Ring. Otherwise proceed to Step 4 - Checking the calibration - Ring.

Step 6 - Zeroing the meter - Ring

Press "MENU" key until "Setup" is displayed. Press the " ▸ " key until the second number from the right flashes. Press the " ▲ " key until "00010" is displayed. Press "MENU" key until "Lo in" is displayed. Press the " ▸ " key until the furthest digit to the right is flashing. Press " ▲ " key until the number is increased or decreased by 1 (depending on direction of offset desired). Press "MENU" key until the meter is reset. Repeat this process until 0.00 ± 0.05 VAC to be displayed.

If the meter will not zero you will need to have it serviced.

Step 7 - Checking the span - Ring

Remove the short from the ring current monitor port. Make sure that both the rack and main disconnect are on. Turn on the control box with the key switch.

NOTE: ***Do NOT enable the rack at this time!***

WARNING: Do NOT touch ANY items inside of the control box during the next step! There is 120 VAC line voltage present!

Connect the Fluke 5101B Calibrator to the ring current monitor and adjust the output to 0.6 VAC @ 60 Hz. The tip current meter should read 60.00 ± .5 AAC. If the meter reads OK, go to the next section entitled Calibrating the Current Probes. Otherwise continue with Step 8 - Adjusting the span - Ring.

Step 8 - Adjusting the span - Ring

Ensure that the Fluke calibrator is connected the ring current monitor. Turn both the rack and main disconnect on. Turn on the rack with the key switch. Adjust the Fluke 5101B Calibrator to 0.600 VAC @ 60 Hz.

Press "MENU" key until "Setup" is displayed. Press the " ▸ " key until the second number from the right flashes. Press the " ▲ " key until "00010" is displayed. Press "MENU" key until "Hi in" is displayed. Press the " ▸ " key until the furthest digit to the right is flashing. Press " ▲ " key until the number is increased or decreased by 1 (depending on direction of offset desired). Press "MENU" key until the meter is reset. Repeat this process until 60.00 ± 0.50 AAC to be displayed.

If you cannot get the meter to read 60.00 ± 0.50 AAC, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Calibrating the Current Probes

Step 1 - Connecting the current probe - Tip

WARNING: Turn both the disconnect on the rack AND the main disconnect to the off position before proceeding!

For this procedure, you will need to connect the Fluke 5101B calibrator manually to the tip current probe (designated T8) located inside the rack.

Please note that due to the current limitations of the Fluke 5101B calibrator, you will only be able to calibrate the current probes between .25 and 1.25 Amps. The final calibration will be performed during the Bellcore second level calibration procedure.

Connect the Fluke 5101B calibrator output in a loop *through* the Tip Current Probe (T8) as shown in Figure 5. Close the door and turn the rack disconnect to the on position.

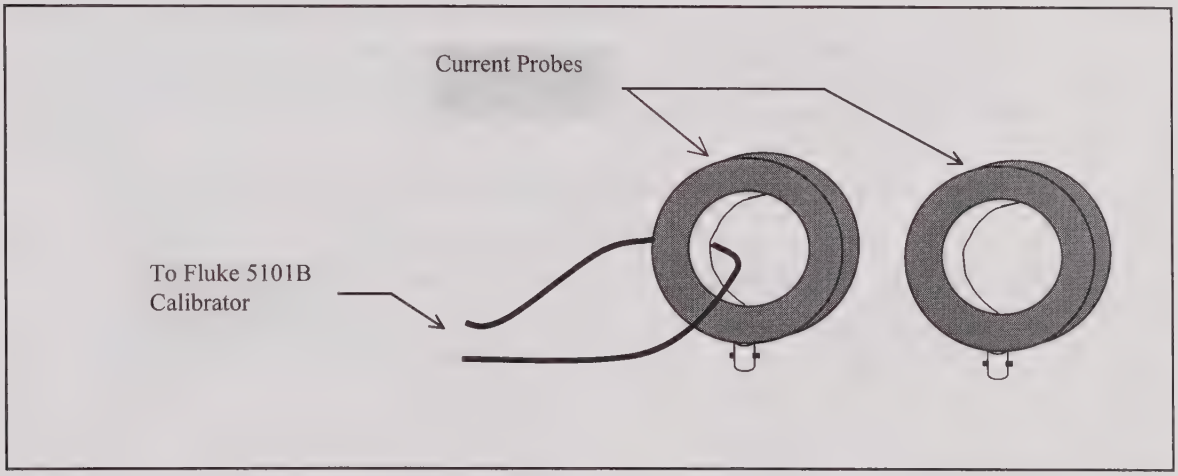

Figure 5 – Current Probes

Step 2 - Check the calibration - Tip

Option the Fluke 5101B to output 1.000 Amps @ 60 Hz. Allow the Tip current meter to stabilize for approximately 30 seconds. The Tip Current meter should read 1.00 ± .05 Amps. If it does ***not*** read within specifications, please repeat the steps 'Calibrating the Current Meters', except note the following deviations:

1. Do not connect the Fluke 5101B calibrator directly to the input to the current meters.
2. Use the Fluke 5101B in *current* mode as described above.
3. Re-zero the meter as described in Step 2 of "Calibrating the Current Meters".
4. Adjust the span with the 1.000 Amp signal. This will calibrate the meter, current probe, and voltage limiting circuitry as one system.

Step 3 - Connecting the current probe - Ring

WARNING: Turn off both the disconnect on the rack AND the main disconnect before proceeding!

For this procedure, you will need to connect the Fluke 5101B calibrator manually to the ring current probe (designated T9) located inside the rack.

Please note that due to the current limitations of the Fluke 5101B calibrator, you will only be able to calibrate the current probes between .25 and 1.25 Amps. The final calibration will be performed during the Bellcore second level calibration procedure.

Connect the Fluke 5101B calibrator output in a loop *through* the Ring Current Probe (T9) as shown in Figure 5. Close the door and turn the rack disconnect to the on position.

Step 4 - Checking the calibration - Ring

Option the Fluke 5101B to output 1.000 Amps @ 60 Hz. Allow the Ring current meter to stabilize for approximately 30 seconds. The Ring Current meter should read 1.00 ± .05 Amps. If it does ***not*** read within specifications, please repeat the steps 'Calibrating the Current Meters', except note the following deviations:

1. Do not connect the Fluke 5101B calibrator directly to the input to the current meters.
2. Use the Fluke 5101B in *current* mode as described above.
3. Re-zero the meter as described Step 2 of "Calibrating the Current Meters".
4. Adjust the span with the 1.000 Amp signal. This will calibrate the meter, current probe, and voltage limiting circuitry as one system.

Verification of the Bellcore First Level Tests

Please note that the following section requires that the power fault rack be fully assembled and ready to perform the tests as described in the Operation Manual.

WARNING: ***The following verification procedures are performed with the Power Fault Rack fully operational. This device uses lethal voltages and currents for the verification procedure. Please use extreme caution during all phases of verification.***

WARNING: ***NEVER attempt to disconnect the test leads when the Emergency Stop button is 'out' or the rack is Enabled!***

Test 1, 50 Vrms @ 0.33 Amps

Step 1 - Connecting the measuring instruments

WARNING: ***Make sure that the Emergency Stop button on the control panel is pushed in.***

Connect the two Fluke 87 DMM's as depicted in Figure 6. Set the Fluke 87's to read AC Voltage.

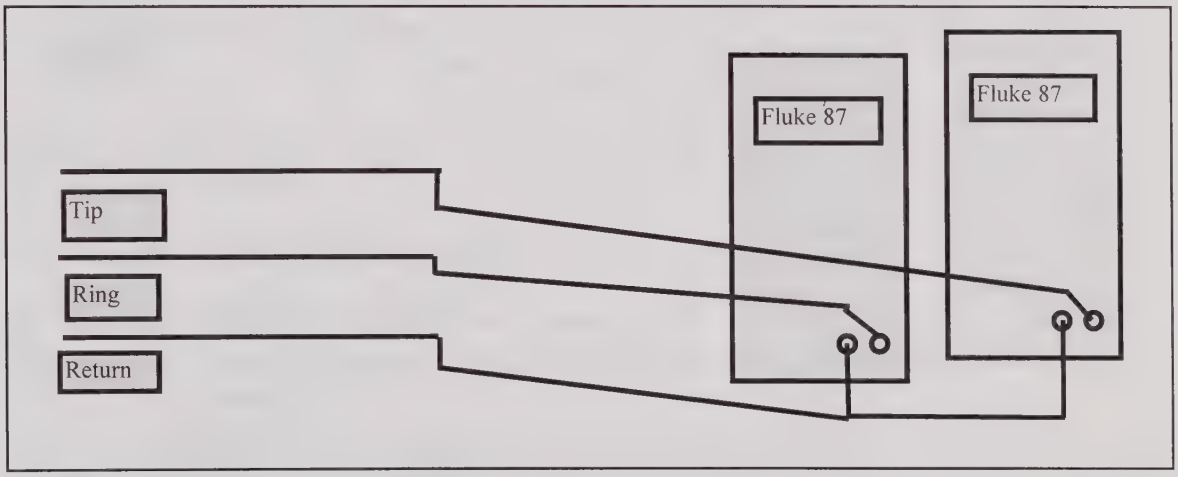

Figure 6 - Measurement Setup - Tip and Ring

Step 2 - Setup the software

Using the Operations Manual as a guide, select the first level Bellcore test number 1.

Select the Tip and Ring connection. After the software prompts you to set the voltage to 50 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 50.0 ± 2 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 50.0 Volts, go ahead and push the 'Begin Test' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. Both front panel volt meters should read 50.0 ± 2.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Set the Fluke 87's to AC Current mode. Be sure to connect to the current terminals on the Fluke 87's. Repeat steps 1 through 2 above. After you have set the voltage to 50.0 ± 2.0 Volts, press the 'Begin Test' button on the computer screen. Monitor the current on the Fluke 87's and record in Table 3. They should both read 0.33 ± .03 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 5 - Checking T1 and R1

Repeat steps 1 through 4 as described but select the T1 and R1 connections as referenced in Figure 7. Record the values in the appropriate places in Table 3.

This completes the verification for Test 1 of the Bellcore first level AC Power Fault Tests.

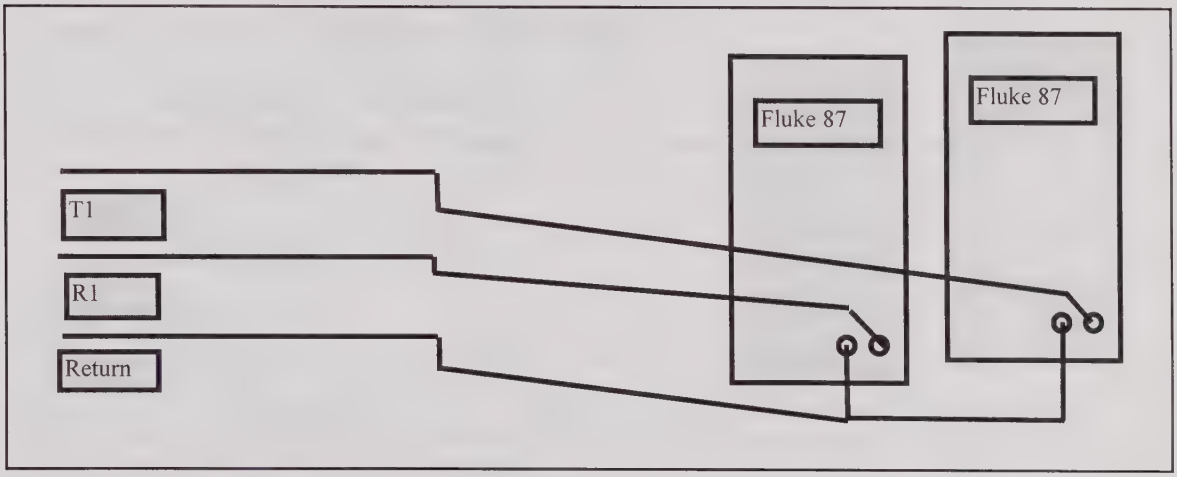

Figure 7 - Measurement Setup - T1 and R1

Test 2, 100 Vrms @ 0.17 Amps

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 6. Set the Fluke 87's to read AC Voltage. Be sure to connect to the voltage terminals on the Fluke 87's.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the first level Bellcore test number 2.

Select the Tip and Ring connection. After the software prompts you to set the voltage to 100 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 100.0 ± 2 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 100.0 Volts, go ahead and push the 'Begin Tests' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 100.0 ± 5.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Set the Fluke 87's to AC Current mode. Be sure to connect to the current terminals on the 87's. Repeat steps 1 through 2 above. After you have set the voltage to 100.0 ± 5.0 Volts, press the 'start' button on the computer screen. Monitor the current on the Fluke 87's and record in Table 3. They should both read 0.17 ± .03 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 5 - Checking T1 and R1

Repeat steps 1 through 4 as described but select the T1 and R1 connections as referenced in Figure 7. Record the values in the appropriate places in Table 3.

This completes the verification for Test 2 of the Bellcore first level AC Power Fault Tests.

Test 3, 200, 400, 600 Vrms @ 1.0 Amp

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 6. Set the Fluke 87's to read AC Voltage. Be sure to connect to the voltage terminals on the 87's.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the first level Bellcore test number 3.

Select the Tip and Ring connection. After the software prompts you to set the voltage to 200 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 200.0 ± 2 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 200.0 Volts, go ahead and push the 'Begin Test' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 200.0 ± 5.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Set the Fluke 87's to AC Current mode. Be sure to connect to the current terminals on the 87's. Repeat steps 1 through 2 above. After you have set the voltage to 200.0 ± 5.0 Volts, press the 'start' button on the computer screen. Monitor the current on the Fluke 87's and record in Table 3. They should both read 0.33 ± .03 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 5 - Checking T1 and R1

Repeat steps 1 through 4 as described but connect instead to T1 and R1. See Figure 7. Record the values in the appropriate places in Table 3.

Step 6 - Repeating the verification at 400 and 600 Vrms

Repeat steps 1 through 5 above, except use 400 Volts as the test voltage. The voltage check should read 400 ± 6.0 Volts and the current check should read 0.66 ± .06 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Repeat steps 1 through 5 above, except use 600 Volts as the test voltage. The voltage check should read 600 ± 10.0 Volts and the current check should read 1.00 ± .10 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Record all values in Table 3.

This completes the verification for Test 3 of the Bellcore first level AC Power Fault Tests.

Test 4, 1000 Vrms @ 1.0 Amp

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 6. Set the Fluke 87's to read AC Voltage. Be sure to connect to the voltage terminals on the 87's.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the first level Bellcore test number 4.

Select the Tip and Ring connection. After the software prompts you to set the voltage to 1000 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 1000.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

NOTE: The Power Fault Rack has a potential to reach 1200 Vrms. The Fluke meters are only rated to 1000 Vrms. Be *very* careful not to set the voltage more than 1010 Vrms on either panel meter!

After you have set the voltage to 1000.0 Volts, go ahead and push the 'Begin Test' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 1000.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 4 - Verifying the current

Set the Fluke 87's to AC Current mode. Be sure to connect to the current terminals on the 87's. Repeat steps 1 through 2 above. After you have set the voltage to 1000.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current on the Fluke 87's and record in Table 3. They should both read 1.0 ± .1 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 5 - Checking T1 and R1

Repeat steps 1 through 4 as described but connect instead to T1 and R1. See Figure 7. Record the values in the appropriate places in Table 3.

This completes the verification for Test 4 of the Bellcore first level AC Power Fault Tests.

Test 5, High Impedance Test @ 600 Vrms

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 6. Set the Fluke 87's to read AC Voltage. Be sure to connect to the voltage terminals on the 87's.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the first level Bellcore test number 5.

Select the Tip and Ring connection. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

NOTE: The Power Fault Rack has a potential to reach 800 Vrms during this test. The internal components used for this test must not exceed 700 Vrms or damage may result!

After you have set the voltage to 600.0 Volts, go ahead and push the 'Begin Test' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 4 - Verifying the current

This test is strictly voltage driven. There is no current to verify.

Step 5 - Checking T1 and R1

Repeat steps 1 through 4 as described but connect instead to T1 and R1. See Figure 7. Record the values in the appropriate places in Table 3.

This completes the verification for Test 5 of the Bellcore first level AC Power Fault Tests.

Test 6, 600 Vrms @ 0.5 Amp

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 6. Set the Fluke 87's to read AC Voltage. Be sure to connect to the voltage terminals on the 87's.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the first level Bellcore test number 6.

Select the Tip and Ring connection. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

NOTE: The Power Fault Rack has a potential to reach 800 Vrms. The internal components used for this test must not exceed 700 Vrms or damage may result!

After you have set the voltage to 600.0 Volts, go ahead and push the 'Begin Test' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 4 - Verifying the current

Set the Fluke 87's to AC Current mode. Be sure to connect to the current terminals on the 87's. Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'Begin Test' button on the computer screen. Monitor the current on the Fluke 87's and record in Table 3. They should both

read 0.5 ± 0.05 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 5 - Checking T1 and R1

Repeat steps 1 through 4 as described but connect instead to T1 and R1. See Figure 7. Record the values in the appropriate places in Table 3.

This completes the verification for Test 6 of the Bellcore first level AC Power Fault Tests.

Test 7, 600 Vrms @ 2.2 Amp

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 6. Set the Fluke 87's to read AC Voltage. Be sure to connect to the voltage terminals on the 87's.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the first level Bellcore test number 7.

Select the Tip and Ring connection. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

NOTE: The Power Fault Rack has a potential to reach 800 Vrms. The internal components used for this test must not exceed 700 Vrms or damage may result!

After you have set the voltage to 600.0 Volts, go ahead and push the 'Begin Test' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 4 - Verifying the current

Set the Fluke 87's to AC Current mode. Be sure to connect to the current terminals on the 87's. Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'Begin Test' button on the computer screen. Monitor the current on the Fluke 87's and record in Table 3. They should both read 2.20 ± 0.20 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 5 - Checking T1 and R1

Repeat steps 1 through 4 as described but connect instead to T1 and R1. See Figure 7. Record the values in the appropriate places in Table 3.

This completes the verification for Test 7 of the Bellcore first level AC Power Fault Tests.

Test 8, 600 Vrms @ 3 Amp

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 6. Set the Fluke 87's to read AC Voltage. Be sure to connect to the voltage terminals on the 87's.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the first level Bellcore test number 8.

Select the Tip and Ring connection. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

NOTE: The Power Fault Rack has a potential to reach 800 Vrms. The internal components used for this test must not exceed 700 Vrms or damage may result!

After you have set the voltage to 600.0 Volts, go ahead and push the 'Begin Test' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 4 - Verifying the current

Set the Fluke 87's to AC Current mode. Be sure to connect to the current terminals on the 87's. Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'Begin Test' button on the computer screen. Monitor the current on the Fluke 87's and record in Table 3. They should both read 3.00 ± 0.30 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 5 - Checking T1 and R1

Repeat steps 1 through 4 as described but connect instead to T1 and R1. See Figure 7. Record the values in the appropriate places in Table 3.

This completes the verification for Test 8 of the Bellcore first level AC Power Fault Tests.

Test 9, 1000 Vrms @ 5.0 Amp

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 6. Set the Fluke 87's to read AC Voltage. Be sure to connect to the voltage terminals on the 87's.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the first level Bellcore test number 9.

Select the Tip and Ring connection. After the software prompts you to set the voltage to 1000 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 1000.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

NOTE: The Power Fault Rack has a potential to reach 1200 Vrms. The Fluke meters are only rated to 1000 Vrms. Be *very* careful not to set the voltage more than 1010 Vrms on either panel meter!

After you have set the voltage to 1000.0 Volts, go ahead and push the 'Begin Test' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 1000.0 ± 10.0

Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 4 - Verifying the current

Set the Fluke 87's to AC Current mode. Be sure to connect to the current terminals on the 87's. Repeat steps 1 through 2 above. After you have set the voltage to 1000.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current on the Fluke 87's and record in Table 3. They should both read 5.0 ± .5 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack.'

Step 5 - Checking T1 and R1

Repeat steps 1 through 4 as described but connect instead to T1 and R1. See Figure 7. Record the values in the appropriate places in Table 3.

This completes the verification for Test 4 of the Bellcore first level AC Power Fault Tests.

Verification of the Bellcore Second Level Tests

Please note that the following section requires that the power fault rack be fully assembled and ready to perform the tests as described in the Operation Manual.

WARNING: ***The following verification procedures are performed with the Power Fault Rack fully operational. The device uses lethal voltages and currents for the verification procedure. Please use extreme caution during all phases of verification.***

WARNING: ***NEVER attempt to disconnect the test leads when the Emergency Stop button is 'out' or the rack is Enabled!***

Test 1, 120 Vrms @ 25.0 Amps

Step 1 - Connecting the measuring instruments

WARNING: ***Make sure that the Emergency Stop button on the control panel is pushed in.***

Connect the two Fluke 87 DMM's as depicted in Figure 5. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the second level Bellcore test number 1 (reference the flow-chart in Figure 9).

Select the two wire test, then Tip. After the software prompts you to set the voltage to 120 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 120.0 ± 5 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 120.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 120.0 ± 5.0 Volts.

Step 4 - Verifying the current

Place the tip test lead through the current probe listed in the equipment table. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 120.0 ± 5.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87's and record in Table 1. They should both read 25.00 ± 1.25 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 5 - Checking T1 and R1

Repeat steps 1 through 5 as described but select the four wire tests as referenced in Figure 7. Connect the Fluke test leads to the output of the current monitor. See Figure 8. Record the values in the appropriate places in Table 3.

This completes the verification for Test 1 (120 Vrms) of the Bellcore second level AC Power Fault Tests.

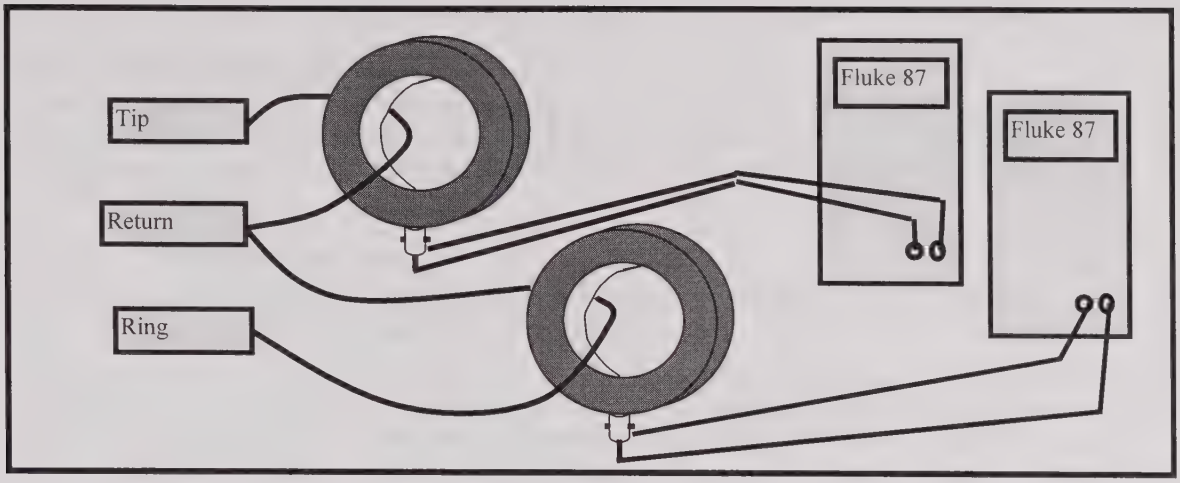

Figure 7 - Measurement Setup - Tip and Ring (Current Probe)

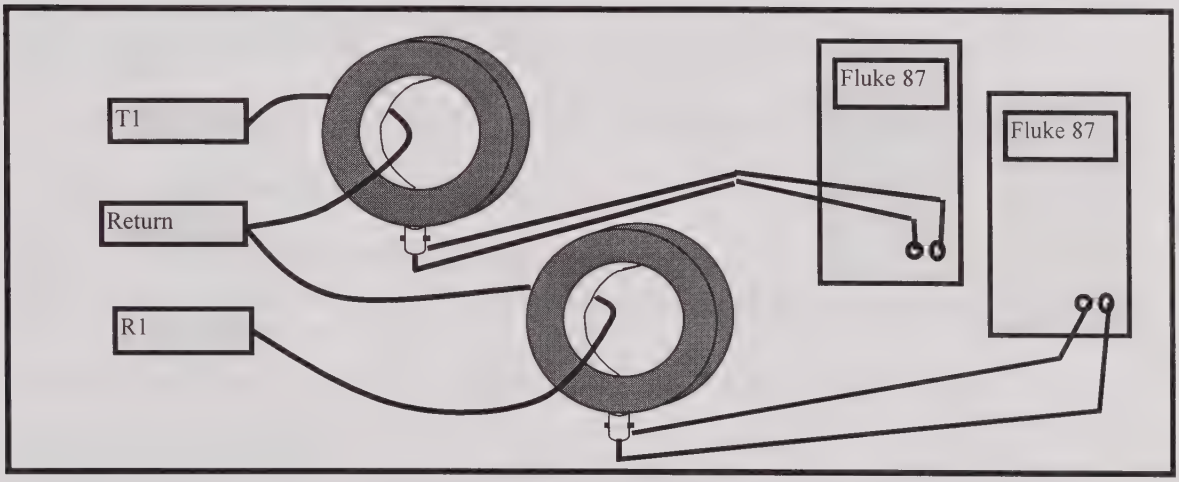

Figure 8 - Measurement Setup - T1 and R1 (Current Probe)

Test 1, 277 Vrms @ 25.0 Amps

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 5. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the second level Bellcore test number 1 (reference the flow-chart in Figure 9).

Select the two wire test, then Tip. After the software prompts you to set the voltage to 277 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 277.0 ± 7 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 277.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 277.0 ± 7.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Place the tip test lead through the calibration current probe listed in the table of equipment. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 277.0 ± 7.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87's and record in Table 3. They should both read 25.00 ± 1.25 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 5 - Checking T1 and R1

Repeat steps 1 through 5 as described but select the four wire tests as referenced in Figure 7. Connect the Fluke test leads to the output of the current monitor. See Figure 8. Record the values in the appropriate places in Table 3.

This completes the verification for Test 1 (277 Vrms) of the Bellcore second level AC Power Fault Tests.

Test 2, 600 Vrms @ 60.0 Amps

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 5. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the second level Bellcore test number 1 (reference the flow-chart in Figure 9).

Select the two wire test, then Tip. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 600.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Place the tip test lead through the current probe. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87's and record in Table 3. They should both read 60.00 ± 5.00 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 5 - Checking T1 and R1

Repeat steps 1 through 5 as described but select the four wire tests as referenced in Figure 7. Connect the Fluke test leads to the output of the current monitor. See Figure 8. Record the values in the appropriate places in Table 3.

This completes the verification for Test 2 of the Bellcore second level AC Power Fault Tests.

Test 3, 600 Vrms @ 7.0 Amps

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 5. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the second level Bellcore test number 1 (reference the flow-chart in Figure 9).

Select the two wire test, then Tip. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 600.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Place the tip test lead through the calibration current probe listed in the table of equipment. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87's and record in Table 3. They should both read 7.00 ± .50 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 5 - Checking T1 and R1

Repeat steps 1 through 5 as described but select the four wire tests as referenced in Figure 7. Connect the Fluke test leads to the output of the current monitor. See Figure 8. Record the values in the appropriate places in Table 3.

This completes the verification for Test 3 of the Bellcore second level AC Power Fault Tests.

Test 4, 600 Vrms @ 2.2 Amps

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 5. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the second level Bellcore test number 1 (reference the flow-chart in Figure 9).

Select the two wire test, then Tip. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 600.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Place the tip test lead through the calibration current probe listed in the table of equipment. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87's and record in Table 3. They should both read 2.20 ± .20 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 5 - Checking T1 and R1

Repeat steps 1 through 5 as described but select the four wire tests as referenced in Figure 7. Connect the Fluke test leads to the output of the current monitor. See Figure 8. Record the values in the appropriate places in Table 3.

This completes the verification for Test 4 of the Bellcore second level AC Power Fault Tests.

Test 5, High Impedance Test @ 600 Vrms

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 5. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the first level Bellcore test number 4 (reference the flow-chart in Figure 9).

Select the two wire test, then Tip. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

NOTE: The Power Fault Rack has a potential to reach 800 Vrms during this test. The internal components used for this test must not exceed 700 Vrms or damage may result!

After you have set the voltage to 600.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 3. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

This test is strictly voltage driven. There is no current to verify.

Step 5 - Checking T1 and R1

Repeat steps 1 through 5 as described but connect instead to T1 and R1. See Figure 6. Record the values in the appropriate places in Table 3.

This completes the verification for Test 5 of the Bellcore second level AC Power Fault Tests.

Test 6 - Manual Current Tests

See the section entitled 'Manual Current Verification' on page 16.

Verification of the UL Longitudinal Tests

Please note that the following section requires that the power fault rack be fully assembled and ready to perform the tests as described in the Operation Manual.

WARNING: ***The following verification procedures are performed with the Power Fault Rack fully operational. The device uses lethal voltages and currents for the verification procedure. Please use extreme caution during all phases of verification.***

WARNING: ***NEVER attempt to disconnect the test leads when the Emergency Stop button is 'out' or the rack is Enabled!***

Test 1, 600 Vrms @ 40.0 Amps

Step 1 - Connecting the measuring instruments

WARNING: ***Make sure that the Emergency Stop button on the control panel is pushed in.***

Connect the two Fluke 87 DMM's as depicted in Figure 5. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the UL Longitudinal test number 1 (reference the flow-chart in Figure 9).

Select the test. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 600.0 Volts, push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 4. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Place the tip test lead through the current probe. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87's and record in Table 4. They should both read 40.00 ± 3.00 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

This completes the verification for Test 1 (120 Vrms) of the Bellcore second level AC Power Fault Tests.

Test 2, 600 Vrms @ 7.0 Amps

Step 1 - Connecting the measuring instruments

WARNING: ***Make sure that the Emergency Stop button on the control panel is pushed in.***

Connect the two Fluke 87 DMM's as depicted in Figure 5. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the UL Longitudinal test number 2 (reference the flow-chart in Figure 9).

Select the Tip and Ring Test. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 600.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 4. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Place the tip test lead through the calibration current probe listed in the table of equipment. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87's and record in Table 4. They should both read 7.00 ± .50 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Test 4, 600 Vrms @ 2.2 Amps

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Connect the two Fluke 87 DMM's as depicted in Figure 5. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the UL Longitudinal test number 3 (reference the flow-chart in Figure 9).

Select the two wire test, then Tip. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 600.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87's and record in Table 4. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Place the tip test lead through the calibration current probe listed in the table of equipment. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87's and record in Table 4. They

should both read 2.20 ± .20 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Test 4 - Manual Current Test

See the section entitled 'Manual Current Verification' on page 16.

Verification of the UL Metallic Tests

Please note that the following section requires that the power fault rack be fully assembled and ready to perform the tests as described in the Operation Manual.

WARNING: ***The following verification procedures are performed with the Power Fault Rack fully operational. The device uses lethal voltages and currents for the verification procedure. Please use extreme caution during all phases of verification.***

WARNING: ***NEVER attempt to disconnect the test leads when the Emergency Stop button is 'out' or the rack is Enabled!***

Test 1, 600 Vrms @ 40.0 Amps

Step 1 - Connecting the measuring instruments

WARNING: ***Make sure that the Emergency Stop button on the control panel is pushed in.***

Using Figure 5 as a guide, connect *one* Fluke 87 DMM between Tip and Return. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the UL Metallic test number 1 (reference the flow-chart in Figure 9).

Select the test. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.

Step 3 - Verifying the voltage

After you have set the voltage to 600.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87 and record in Table 5. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Place the tip test lead through the calibration current probe listed in the table of equipment. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87 and record in Table 5. They should both read 40.00 ± 3.00 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

This completes the verification for Test 1 (120 Vrms) of the Bellcore second level AC Power Fault Tests.

Test 2, 600 Vrms @ 7.0 Amps

Step 1 - Connecting the measuring instruments

WARNING: ***Make sure that the Emergency Stop button on the control panel is pushed in.***

Using Figure 5 as a guide, connect *one* Fluke 87 DMM between Tip and Return. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the UL Metallic test number 2 (reference the flow-chart in Figure 9).

Select the Tip and Ring Test. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Either adjust the variac control wheel until the front panel meters read 600.0 ± 10 Volts or wait for the rack to automatically set the voltage.Step 3 - Verifying the voltage

After you have set the voltage to 600.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87 and record in Table 5. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Place the tip test lead through the calibration current probe listed in the table of equipment. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87's and record in Table 5. They should both read 7.00 ± .50 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Test 4, 600 Vrms @ 2.2 Amps

Step 1 - Connecting the measuring instruments

WARNING: Make sure that the Emergency Stop button on the control panel is pushed in.

Using Figure 5 as a guide, connect *one* Fluke 87 DMM between Tip and Return. Set the Fluke 87's to read AC Voltage.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the UL Metallic test number 3 (reference the flow-chart in Figure 9).

Select the two wire test, then Tip. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Please adjust the variac control wheel until the front panel meters read 600.0 ± 10.0 Volts.

Step 3 - Verifying the voltage

After you have set the voltage to 600.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87 and record in Table 5. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Place the tip test lead through the calibration current probe listed in the table of equipment. Connect the current probe output to the voltage input of the Fluke 87. (See Figure 7)

Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, press the 'start' button on the computer screen. Monitor the current with the Fluke 87's and record in Table 5. They

should both read 2.20 ± .20 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Test 4 - Manual Current Test

See the section entitled 'Manual Current Verification' on page 16.

Manual Current Verification

Please note that the following section requires that the power fault rack be fully assembled and ready to perform the tests as described in the Operation Manual.

WARNING: ***The following verification procedures are performed with the Power Fault Rack fully operational. The device uses lethal voltages and currents for the verification procedure. Please use extreme caution during all phases of verification.***

WARNING: ***NEVER attempt to disconnect the test leads when the Emergency Stop button is 'out' or the rack is Enabled!***

Generic Verification Procedure for the Manual Current Tests

Step 1 - Connecting the measuring instruments

WARNING: ***Make sure that the Emergency Stop button on the control panel is pushed in.***

Using Figure 5 as a guide, connect two Fluke 87 DMM's between Tip and Return. Set the Fluke 87's to read AC Voltage.

Also reference Table 6 as a guide to the manual current tests which should be verified. These steps initially step through the *first* of *five* verification tests which need to be performed.

Step 2 - Setup the software

Using the Operations Manual as a guide, select the Bellcore .75 - 1.25 Amp manual current test.

Select the test. After the software prompts you to set the voltage to 600 by the front panel meters, do so. Please adjust the variac control wheel until the front panel meters read 600.0 ± 10.0 Volts.

Step 3 - Verifying the voltage

After you have set the voltage to 600.0 Volts, go ahead and push the 'start' button on the computer screen. Monitor the voltage on the Fluke 87 and record in Table 6. They should read 600.0 ± 10.0 Volts. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Step 4 - Verifying the current

Setup the Fluke 87's as depicted in Figure 6. Set the Fluke 87's to measure AC Current.

Repeat steps 1 through 2 above. After you have set the voltage to 600.0 ± 10.0 Volts, follow the prompts on the computer screen. When the test starts, monitor the current with the Fluke 87's and record in Table 6. The current should be 0.75 ± .10 Amps. If they do not, there is a hardware problem with the Power Fault Rack. Please read the section titled 'Service of the Power Fault Rack .'

Table 6 provides five manual current tests which should be verified. Using Table 6 as a guide, Repeat steps 1 through 4 and record the results in Table 6.

This completes the verification for all manual current tests.

Service of the Power Fault Rack

The CDI Power Fault Rack will need serviced when any of the following occur:

The software does not control the rack properly. If this condition occurs, it usually will just not run the test properly.

During this calibration procedure, you cannot adjust the voltage, current or resistance to within specification.

Servicing is designed to be performed with a qualified Power Fault Rack engineer, as there are no user-servicable parts inside.

If service is required, you may contact CDI to schedule an engineer to service it.

References

GR-1089-CORE Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment. A Module of LSSGR, FR-64; TSGR, FR-440; and NEBSFR, FR-2063.

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Specifications - Power Fault Rack

NOTE: The following table represents the *MAXIMUM* current and voltages the Power Fault Rack is capable of. Also, the minimum rest times are the minimum time that should elapses *before* performing another test.

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Table 1 - Power Fault Rack Specifications

Meter	Test	Criteria		Measured Values		Percent Error		Results
		Voltage	Current	Voltage	Current	Voltage	Current	Pass/Fail
Tip	Tip							
Ring	Ring							

Table 2 - Meter Calibration

GR-1089 Level 1							
		Criteria		Measured at Output		Percent Error	
Test	Connection to Generator	Voltage (Vrms)	Current (Arms)	Voltage (Vrms)	Current (Arms)	Voltage (%)	Current (%)
1	Tip	50	0.33				
	Ring	50	0.33				
	Tip with Ring	50	0.33				
	Ring with Tip	50	0.33				
	T1	50	0.33				
	R1	50	0.33				
	T1 with R1	50	0.33				
	R1 with T1	50	0.33				
2	Tip	100	0.17				
	Ring	100	0.17				
	Tip with Ring	100	0.17				
	Ring with Tip	100	0.17				
	T1	100	0.17				
	R1	100	0.17				
	T1 with R1	100	0.17				
	R1 with T1	100	0.17				
3a	Tip	200	0.33				
	Ring	200	0.33				
	Tip with Ring	200	0.33				
	Ring with Tip	200	0.33				
	T1	200	0.33				
	R1	200	0.33				
	T1 with R1	200	0.33				
	R1 with T1	200	0.33				
3b	Tip	400	0.66				
	Ring	400	0.66				
	Tip with Ring	400	0.66				
	Ring with Tip	400	0.66				
	T1	400	0.66				
	R1	400	0.66				
	T1 with R1	400	0.66				
	R1 with T1	400	0.66				
3c	Tip	600	1.0				
	Ring	600	1.0				
	Tip with Ring	600	1.0				
	Ring with Tip	600	1.0				
	T1	600	1.0				
	R1	600	1.0				
	T1 with R1	600	1.0				
	R1 with T1	600	1.0				
4	**Tip** with Ring	1000	1.0				
	Ring with Tip	1000	1.0				
	T1 with R1	1000	1.0				
	R1 with T1	1000	1.0				
	Tip with R,T1,&R1	1000	1.0				
	Ring with T,T1&R1	1000	1.0				
	T1 with T,R&R1	1000	1.0				
	R1 with T,R&T1	1000	1.0				
5	**Tip** with Ring	600	NONE				
	Ring with Tip	600	NONE				
	T1 with R1	600	NONE				
	R1 with T1	600	NONE				
6	Tip	600	0.5				
	Ring	600	0.5				
	Tip with Ring	600	0.5				

GR-1089 Level 1							
		Criteria		Measured at Output		Percent Error	
Test	Connection to Generator	Voltage (Vrms)	Current (Arms)	Voltage (Vrms)	Current (Arms)	Voltage (%)	Current (%)
	Ring with Tip	600	0.5				
	T1	600	0.5				
	R1	600	0.5				
	T1 with R1	600	0.5				
	R1 with T1	600	0.5				
7	Tip	600	2.2				
	Ring	600	2.2				
	Tip with Ring	600	2.2				
	Ring with Tip	600	2.2				
	T1	600	2.2				
	R1	600	2.2				
	T1 with R1	600	2.2				
	R1 with T1	600	2.2				
8	Tip	600	3.0				
	Ring	600	3.0				
	Tip with Ring	600	3.0				
	Ring with Tip	600	3.0				
	T1	600	3.0				
	R1	600	3.0				
	T1 with R1	600	3.0				
	R1 with T1	600	3.0				
9	**Tip** with Ring	1000	5.0				
	Ring with Tip	1000	5.0				
	T1 with R1	1000	5.0				
	R1 with T1	1000	5.0				
	Tip with R,T1,&R1	1000	5.0				
	Ring with T,T1&R1	1000	5.0				
	T1 with T,R&R1	1000	5.0				
	R1 with T,R&T1	1000	5.0				

Table 3 - Bellcore First Level Verification Sheet

GR-1089 Level 2							
Test	Connection to Generator	Criteria		Measured Values		Percent Error	
		Voltage (Vrms)	Current (Arms)	Voltage (Vrms)	Current (Arms)	Voltage (%)	Current (%)
1a	Tip	120	25.0				
	Ring	120	25.0				
	Tip with Ring	120	25.0				
	Ring with Tip	120	25.0				
	T1	120	25.0				
	R1	120	25.0				
	T1 with R1	120	25.0				
	R1 with T1	120	25.0				
1b	Tip	277	25.0				
	Ring	277	25.0				
	Tip with Ring	277	25.0				
	Ring with Tip	277	25.0				
	T1	277	25.0				
	R1	277	25.0				
	T1 with R1	277	25.0				
	R1 with T1	277	25.0				
2	Tip	600	60.0				
	Ring	600	60.0				
	Tip with Ring	600	60.0				
	Ring with Tip	600	60.0				
	T1	600	60.0				
	R1	600	60.0				
	T1 with R1	600	60.0				
	R1 with T1	600	60.0				
3	Tip	600	7.0				
	Ring	600	7.0				
	Tip with Ring	600	7.0				
	Ring with Tip	600	7.0				
	T1	600	7.0				
	R1	600	7.0				
	T1 with R1	600	7.0				
	R1 with T1	600	7.0				
4a	Tip	600	2.2				
	Ring	600	2.2				
	Tip with Ring	600	2.2				
	Ring with Tip	600	2.2				
	T1	600	2.2				
	R1	600	2.2				
	T1 with R1	600	2.2				
	R1 with T1	600	2.2				
4b	Tip	600	5.0				
	Ring	600	5.0				
	Tip with Ring	600	5.0				
	Ring with Tip	600	5.0				
	T1	600	5.0				
	R1	600	5.0				
	T1 with R1	600	5.0				
	R1 with T1	600	5.0				
5	**Tip** with Ring	600	NONE				
	Ring with Tip	600	NONE				
	T1 with R1	600	NONE				
	R1 with T1	600	NONE				

Table 4 - Bellcore Second Level Verification Sheet

UL1950							
Test	Connection to Generator	Criteria	Measured Values			Percent Error	
		Voltage (Vrms)	Current (Arms)	Voltage (Vrms)	Current (Arms)	Voltage	Current
M1	Tip/T1	600	40.0				
	Ring/R1	600	40.0				
M2	Tip/T1	600	7.0				
	Ring/R1	600	7.0				
M3	Tip/T1	600	2.2				
	Ring/R1	600	2.2				
Current should be set using the Variable Resistor.							
M3a	Tip/T1	600	1.0				
	Ring/R1	600	1.0				
	Tip/T1	600	2.0				
	Ring/R1	600	2.0				
Current should be set using the Variable Resistor.							
M4	Tip/T1	100	2.0				
	Ring/R1	100	2.0				
	Tip/T1	600	2.0				
	Ring/R1	600	2.0				
L1/F1	**Tip**/Ring	600	40				
	Tip/**Ring**	600	40				
	Tip	600	40				
	Ring	600	40				
L2/F2	**Tip**/Ring	600	7				
	Tip/**Ring**	600	7				
L3/F3	**Tip**/Ring	600	2.2				
	Tip/**Ring**	600	2.2				
Current should be set using the Variable Resistor.							
L3a/F3a	**Tip**/Ring	600	2.0				
	Tip/**Ring**	600	2.0				
	Tip/Ring	600	1.0				
	Tip/**Ring**	600	1.0				
Current should be set using the Variable Resistor.							
L4/F4	Tip/T1	100	2.0				
	Ring/R1	100	2.0				
	Tip/T1	600	2.0				
	Ring/R1	600	2.0				
L5	**Tip**/Ring	120	25.0				
	Tip/**Ring**	120	25.0				

Table 5 – UL 1950 Verification Sheet

Bring Vector Analyzer for the KTL Rack

MP MASTER
MA34952